

**UNITED STATES DISTRICT COURT  
DISTRICT OF MASSACHUSETTS**

SINGULAR COMPUTING LLC,

Plaintiff,

v.

GOOGLE LLC,

Defendant.

Civil Action No. 1:19-cv-12551-FDS

Leave to File Granted on March 22, 2021.  
Docket No. 148.

Hon. F. Dennis Saylor IV

**PLAINTIFF SINGULAR COMPUTING LLC'S  
RESPONSIVE SUPPLEMENTAL CLAIM CONSTRUCTION BRIEF**

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Plaintiff, Singular Computing LLC (“Singular”), respectfully submits this Responsive Supplemental Claim Construction Brief addressing the Supplemental Brief filed by defendant, Google LLC (“Google”), on March 16, 2021 (Dkt. No. 146).

## **I. INTRODUCTION**

At the most recent Status Conference, Google asked the Court for permission to file a third, “Supplemental” Brief in order to present testimony from the deposition of Singular’s technical expert, Dr. Sunil Khatri, that allegedly would reveal inconsistencies between Dr. Khatri’s opinions in this case and “positions Singular has taken in the IPRs.” *See* Dkt. No. 142 at 5. Google’s Supplemental Brief however, does not identify a single such inconsistency. Instead, Google mischaracterizes Dr. Khatri’s deposition testimony and crops Dr. Khatri’s declaration.<sup>1</sup>

Specifically, Google first argues that Dr. Khatri’s testimony “confirms” that the claimed “statistical mean over repeated execution” is indefinite. Google Supp. Br. at 1. This is patently incorrect. Dr. Khatri, in fact testified that the scope of this term is “as clear as daylight” and that

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<sup>1</sup> On page 2 of its brief, Google twice crops paragraph 33 of Dr. Khatri’s declaration and misstates the content of his deposition at page 52, lines 10-16. The cropped portion of the declaration states:

“and initially, a fluctuating arithmetic *average*. However, a POSITA would understand that the output values of repeated executions of the same operation must exhibit the following statistical behavior for the computer to be usable: the average of those output values, over repeated executions, goes from being an arithmetic average that potentially has an unstable value when computed based on a small number of executions, to a stable statistical mean that does not meaningfully fluctuate. Moreover, once enough repeated executions have occurred, that statistical mean no longer materially changes no matter how many more repeated executions are conducted over the useful life of the computer.”

With respect to Dr. Khatri’s deposition testimony, such testimony was with regard to only line 2 of paragraph 33 of his declaration. Line 2 dealt with the “initial” fluctuations in his graph, not the “statistical mean” as explained in detail in the above.

it is “quite clear as to what the person of ordinary skill in the art needs to do” to determine whether this limitation is met. *See* Ex. A (Khatri Dep. Tr.) at 29:1; 25:18-20.

Google then claims that Dr. Khatri’s testimony supports its attempt to rewrite the asserted claims by replacing the word “signal” with the word “value.” Supp. Br. at 1. But again, Dr. Khatri rejects this position, confirming that the claimed LPHDR execution unit “performs operations on input signals,” and that the distinction between signals and values is “important to make.” Ex A at 132:12-17.

## **II. ARGUMENT**

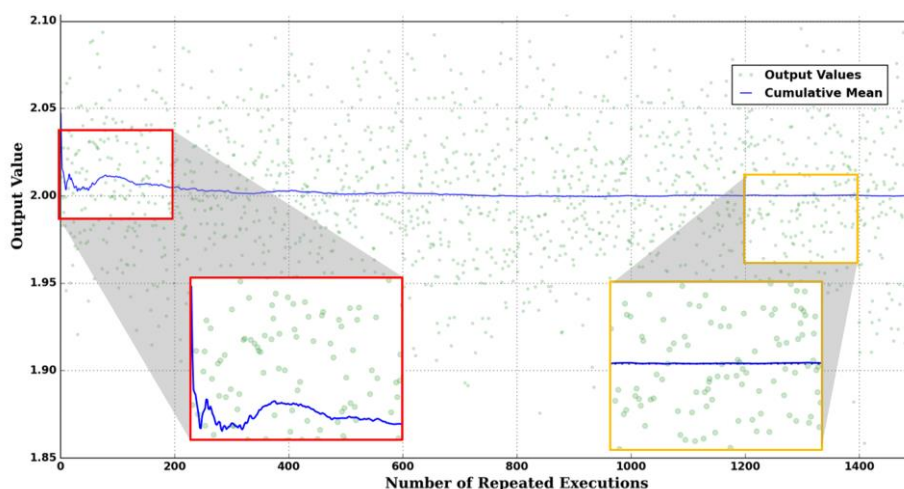
### **A. “Repeated Execution”**

Google’s indefiniteness argument is premised on its argument that the term “repeated execution” does not specify exactly how many executions are necessary to infringe. Google Third Br. (Dkt. No. 146) at 1. In making this argument, Google ignores that the claim recites “*statistical mean*, over repeated execution.” In addition, Google’s technical expert, Dr. Gu-Yeon Wei, offers no evidence that one of ordinary skill in the art, with knowledge of fundamental “statistical” analysis, could not determine a “statistical mean, over repeated execution.” Nor does Google or Dr. Wei contest or even mention Dr. Khatri’s graph depicting the ease of determining infringement.

Throughout Dr. Khatri’s Declaration, Singular provides evidence that, as the number of repeated executions increases, the average of the output values stabilizes to a fixed value, which is the claimed “*statistical mean*.” *See* Khatri Decl. (Dkt. No. 135-1) at ¶¶ 34-35. Dr. Khatri explains that this is due to a statistical principle known as the “Law of Large Numbers,” which a person of ordinary skill in the art would have learned in an undergraduate college statistics

course. *Id.* Google and Dr. Wei however chose to ignore this basic law of statistics, and the conjoined claim term “statistical mean.”

Dr. Khatri supports his opinions with undisputed experimental evidence. As Dr. Khatri explains in his Declaration and his deposition testimony, he performed the same analog circuit simulation as Dr. Wei, with exactly the same parameters, but with 1,500 executions instead of 10. *See, e.g.*, Khatri Decl. (Dkt. No. 135-1) at ¶ 34. The results of his experiments are illustrated in the graph below and show, as the number of repeated executions increases, that the average of the outputs stabilizes to a constant value, which is the claimed statistical mean:



*See* Khatri Decl. (Dkt. No. 135-1) at ¶ 34; *see also* Ex. A (Khatri Dep. Tr.) at 70:16-71:14; 72:21-74:13. Notably, neither Google nor Dr. Wei address this graph, nor do they acknowledge that the average output value of a usable analog circuit, stabilizes over time to a calculable “statistical mean.” *See* Khatri Decl. (Dkt. No. 135-1) at ¶¶ 33, 34.

Google now attempts to dismiss Dr. Khatri’s opinion as “not just *ipse dixit*, but multiple levels of *ipse dixit*.” *See* Google Supp. Br. at 3. Not so. Dr. Khatri a distinguished Professor of Electrical and Computer Engineering with hundreds of peer-reviewed publications conducted an experiment that *proves* on its face that the average output value after repeated execution

stabilizes to the claimed statistical mean, in less than a millionth of a second. *See* Khatri Decl. (Dkt. No. 135-1) at ¶ 34. In contrast, Dr. Wei avoided any discussion of the laws of statistical analysis and how these laws apply to the behavior of analog circuits (*see* Sing. Reply. Br. (Dkt. No. 135) at 8), and conveniently stopped his experiment after just 10 executions, before the stability of the statistical mean could be revealed. *See* Wei Decl. (Dkt. No. 114) at ¶ 39 (describing a test involving just “ten hypothetical executions”). In view of the above, Google’s third brief only highlights the material disputed facts and the premature nature of its invalidity motion.

#### **B. The Claimed Execution Unit Operates On Signals, Not Values**

Both of Google’s proposed claim constructions impermissibly seek to rewrite the claims by replacing the term “signal” with the term “value.” Google’s construction contradict the plain language of the asserted claims as written, the testing of Dr. Khatri, and even the declaration of its own expert Dr. Wei and thus must be rejected.

The claimed “execution unit” operates on “signals” that *represent* numerical values, and do not perform operations directly on values. *See, e.g.,* Sing. Open. Br. at 12. This position is fully consistent with Dr. Khatri’s deposition testimony, which explains how the claimed “operation”, which is performed on signals, is distinct from the corresponding arithmetic that is performed on values:

“[a]n LPHDR execution unit performs operations on input signals, you know, which have values ... this arithmetic is done based on numbers which are represented by voltages. So the operations — in this statement it’s quite clear that the operation is done on voltages, and that results in numbers that these voltages represent, just as shown in the claims of the patent.”

Ex. A (Khatri Dep. Tr.) at 132:16-17 and Dr. Wei’s declaration (Dkt. No. 114) at ¶ 21 (“Variances in these signals represent different numerical values”). Singular’s position has never changed regarding this term.<sup>2</sup>

Google’s position on this term however has changed with each new round of briefing. In its opening brief, Google based its argument on the premise that “the ‘first input signal’ cannot have a dynamic range” Google Open. Br. (Dkt. No. 111) at 19. However, as Dr. Khatri explained in his Declaration, “this assertion is technically incorrect.” In its latest brief, Google admits that its original premise was incorrect. *See* Google Supp. Br. at 7 (“Google agrees that signals themselves can have dynamic ranges”).

For the reasons given above and in Singular’s previous briefs, Singular submits the claim terms proposed by Google be given, as Google represents in the IPR, their plain and ordinary meaning.

### **III. CONCLUSION**

For the reasons set forth above, Singular requests that the Court adopt Singular’s sole proposed construction and reject Google’s proposed constructions and invalidity positions.

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<sup>2</sup> Google asserts that various statements made by Singular and Dr. Khatri in the related IPR proceedings support its attempt to read the term “signal” out of the claim. *See* Google Supp. Br. at 6. When read in context, however, these statements only argue that the claims are not limited to any particular *type* of signal, and clearly do not support the proposition that the claims require no “signals” at all.

Dated: March 22, 2021

Respectfully submitted,

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**CERTIFICATE OF SERVICE**

I hereby certify that all counsel of record who have consented to electronic service are being served with a copy of this document via the Court's CM/ECF system.

/s/ Paul J. Hayes